WHAT IS CLAIMED IS:

1. A coupling assembly comprising:
   a plurality of composite substrate layers and a flange layer fusion bonded together in a stacked arrangement wherein said substrate layers are positioned on top of a flange layer and said substrate layers comprising embedded signal processing circuitry;
   a signal input and a signal output each coupled to the embedded signal processing circuitry; and
   a cavity formed through an area of the plurality of substrate layers, said cavity exposing signal connection terminals coupled to the signal processing circuitry to enable the addition of a circuit element to the assembly after the fusion bonding of the flange and substrate layers and to enable coupling of the added circuit element to the signal processing circuitry.

2. The assembly of claim 1 wherein the embedded signal processing circuitry comprises:
   first signal processing circuitry coupled to the signal input and to a first signal connection terminal exposed within the cavity; and
   second signal processing circuitry coupled to the signal output and to a second signal connection terminal exposed within the cavity.

3. The assembly of claim 2 wherein said first embedded signal processing circuitry and said second embedded signal processing circuitry comprise microwave coupler circuitry.

4. The assembly of claim 3 wherein the first and second embedded signal processing circuitry further comprise impedance matching circuitry.

5. The assembly of claim 4 wherein said first embedded signal processing circuitry and said second embedded signal processing circuitry comprise circuitry selected from the group consisting of DC blocking circuitry, bias decoupling circuitry, and a RF load termination.

6. The assembly of claim 3 wherein the assembly is configured for addition of an added circuit element selected from the group consisting of a microwave circuit, a transistor, a varactor diode, a PIN diode, and a Shottky diode.

7. The assembly of claim 2 further comprising a plurality of conductive terminals exposed within the cavity and coupled to conductive terminals on an exterior surface of the assembly to provide for signal connections between a circuit element added to the cavity and external signal sources.

8. The assembly of claim 2 wherein:
the cavity exposes a top surface of the flange layer enabling coupling of the added circuit element to the flange layer.

9. The assembly of claim 1 wherein said flange layer comprises a substantially homogeneous metal core and said composite substrate layers comprise fluoropolymer composite material.

10. The assembly of claim 9 wherein coupling of the added circuit element to the flange layer comprises thermal coupling between said circuit element and the flange layer.

11. The assembly of claim 10 wherein said flange layer consist of said metal core and plated metals added to surfaces of said metal core.

12. The assembly of claim 11 wherein said plated metals added to the surface comprises a metal inhibiting oxidation of said metal core.

13. The assembly of claim 1, wherein at least two of said plurality of substrate layers are connected by plated via holes.

14. A coupling assembly comprising:

a flange layer comprising a substantially homogeneous metal core and plated metals added to surfaces of said metal core and inhibiting oxidation of said metal core;

a plurality of fusion bonded composite substrate layers comprising a fluoropolymer material, said layers positioned in a stacked arrangement on top of the flange layer and comprising first and second embedded signal processing circuitry;

a signal input coupled to the first embedded signal processing circuitry;

a signal output coupled to the second embedded signal processing circuitry;

a cavity formed through an area of the plurality of substrate layers and exposing a top surface of the flange layer, said cavity exposing first signal connection terminals coupled to the first signal processing circuitry and second signal connection terminals coupled to the second signal processing circuitry, said cavity enabling the addition of a circuit element to the assembly after the fusion bonding of the substrate layers and enabling coupling of the added circuit element to the signal processing circuitry and to the flange layer.

15. The assembly of claim 14 wherein said first embedded signal processing circuitry and said second embedded signal processing circuitry comprise microwave coupler circuitry.

16. The assembly of claim 15 wherein the first and second embedded signal processing circuitry further comprise impedance matching circuitry.

17. The assembly of claim 14 wherein said first embedded signal processing circuitry and said second embedded signal processing circuitry comprise circuitry selected from the group consisting of DC blocking circuitry, bias decoupling circuitry, and a RF load termination.

18. The assembly of claim 14 further comprising a plurality of conductive terminals exposed within the cavity and coupled to conductive terminals on an exterior surface of the assembly to provide for signal connections between a circuit element added to the cavity and external signal sources.

19. The assembly of claim 18, wherein said first signal processing circuitry is formed by metallization disposed on surfaces of at least two of said plurality of substrate layers and said at least two of said plurality of substrate layers are connected by plated via holes.

20. A subassembly manufactured by a process comprising the steps of:
manufacturing a plurality of composite substrate layers;
manufacturing a flange layer comprising a substantially homogeneous metal core;
drilling through said composite substrate layers to create a plurality of vias;
forming a cutout in each of the plurality of composite substrate layers such that when the composite substrate layers are positioned in a stacked arrangement on top of the flange layer said cutouts form a cavity through the substrate layers that exposes a top surface of the flange layer;

selectively metalicizing surfaces of said composite substrate layers to form embedded signal processing circuitry elements, a signal input terminal, a signal output terminal, a first and a second signal connection terminal exposed within said formed cavity, and conductive vias interconnecting said embedded signal processing circuitry elements, signal input terminal, signal output terminal, first and second signal connection terminal when the plurality of composite substrate layers are positioned in stacked arrangement;

fusion bonding said plurality of substrate layers to each other and to the flange layer such that the plurality of substrate layers are positioned in a stacked arrangement on top of the flange layer and form an assembly having a cavity through an area of the plurality of substrate layers whereby:

said cavity exposes a top surface of the flange layer and exposes signal connection terminals coupled to the embedded signal processing circuitry, and

said cavity enables the addition of a circuit element to the assembly after the fusion bonding of the substrate layers and enables coupling of the added circuit element to the signal processing circuitry and to the flange layer.

21. The manufacturing process of claim 20 where forming a cutout in each of the plurality of composite substrate layers comprises forming a cutout in a top-most one of the plurality of substrate layers following the fusion bonding of said plurality of substrate layers and forming said cutout in layers sandwiched between said top-most one of the plurality of layers and said flange layer prior to the fusion bonding.